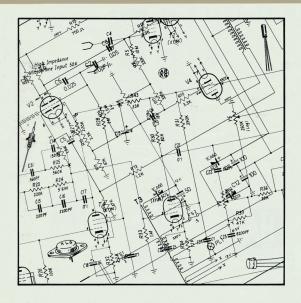
amateur radio Vol. 36, No. 11 NOVEMBER 1968



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Amateur Radio, November, 1968

amateur radio



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JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA FOUNDED 1910

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by the Publications Committee.		

W.I.A. OFFICIAL BROADCASTS

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SIDEBAND ELECTRONICS ENGINEERING

In my last month's (October) advertisement I have included a plug for the ACITRON line of locally constructed equipment. My intention was to show my interest in all promising developments, naturally with also a little commercial consideration included.

A very ambitious programme and it will take time to realise. As soon as more news on the ACITRON line is available you can expect to hear more from me.

Meanwhile I continue to look for diversification, adding more YAESU-MUSEN gear to my stock. This stock will soon include half a dozen different brands, some 15 or more s.s.b. sets and over 25,000 dollars worth of gear! Yes, a long way from a modest start five years ago.

Mobile activity will soon increase and I am ready for it with the WEBSTER Bandspanners and Mark Helical whips, the latter are 6 ft. long radiators for 40 metres and a genuine 10-15-20 metre triband one, no retuning or adjustments required. Also the matter of d.c. supplies will soon be solved with a reasonably priced Australian made unit, adaptable to Drakes, Swans and Galaxies. Target cost price no more than \$100.

For home use I still recommend the MOSLEY and HO-CAIN Junior and the HY-GAIN Master triband 10-15-20 m. Agais. Next best is the all-band trapped NEWIRDMOKS Hustler vertical 4-BIV, which needs no guy ropes under average wind exposure. The German W3-D2Z all-band dipole has become so popular that I had to rush a follow-up order to D-land, but they will soon be in stock again.

Well, hereunder is my expanding list of goodies. For those who don't know me, yet, I sell brandnew imported gear for less than anybody else in Australia, all equipment is fully guaranteed and where necessary checked and tested before shipment. Prices are net, cash, Springwood, N.S.W. As to trade-ins, sorry no a.m. gear or antiquated receivers or disposal items. My very limited profit margin of 10 to 15 per cent. gross does not allow me to be generous or trade ins. 73, Arie Bles.

Latest GALAXY V. Mark III. Transceiver, the smallest powerhouse, \$550.

GALAXY V. Mark II., one unit left, \$475.

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YAESU-MUSEN FLDX-400/FRDX-400 Transmitter-Receiver combination, \$750. FTDX-400 Transceiver, FTDX-100 Transceiver, now \$575 and \$550 resp. FLDX-2000 Linears and FT-50 Transceivers, to come, priced as competitively as the other Yaesu-Musen units!

Grab my last GONSET 2 metre Sidewinder to be ready for the summer 2 metre DX, \$350, including 115v. a.c. supply. Likewise be ready for the 6 metre DX this season with the Swan SW250.

HEATH HA-15 Linears, a few kits left, no more imports after that, \$150.

HY-GAIN TH6DXX, six element 10-15-20 metre beam, with BN-86 Balun, still only \$200.

HY-GAIN TH3JR triband beam, \$105. MOSLEY TA33JR \$98

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NEWTRONICS Hustler 4-BTV, 10-40 mx vertical, \$55. With 80 mx top coil, \$65.

WEBSTER Bandspanner, 10-80 mx centre-loaded Mobile Whip with mountings and spring, still only \$55.

MARK 10-15-20 mx triband Helical Whip, sorry a bit dearer now, \$27.50; Mark 40 mx 6 ft. Helical Whip, \$16.

German W-3-DZZ all-band Dipole, balun with two traps, \$25.

CETRON 572B/160TL 150w. Triodes for Linears, \$18.

\$18. Used spotless COLLINS 75S-3A Receiver, with

Collins speaker, c.w. filter, notch filter, \$500. GALAXY V., used, 10-80 mx Transceiver with 240v. a.c. power supply, \$375.

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OPEN SATURDAY MORNINGS!

Amateur Radio, November, 1968

FEDERAL COMMENT

JOHN B. BATTRICK, VK3OR, Federal President, W.I.A.

In the I.A.R.U. Region I. Bulletin recently received was an editorial by John Clarricoats, O.B.E., G&CL. John, you will remember, was, while Secretary, the driving force behind the R.S.G.B. He now enjoys his retirement (?) as Secretary to I.A.R.U. Region I. Division. He headed his editorial:—"A Dream Comes True," and went on

"Wyy back in 1950 when the idea of establishing an LARU. Region I. Division was first discussed at the Silver establishing and LARU. Region I. Division was first discussed at the Silver the present chairman (SMSZD) and the present Secretary (GeCL) of the Division talked over the possibility of adopting a Regional system of running the difficulties appeared to grow larger until during the winter of 1964, thanks to Mr. Herbert Hoover, Im., first steps reason it has never assumed that title as of right preferring to be known, or fastled preserves the control of Radio Amsteurs—Region 2 Division,

"Last year Member Societies in Region 2 participated in a highly successful conference in Caracas, Venezuela, and as recently as Whitsun of this year the Executive of the Region gathered in Monterrey, Mexico, to discuss the problems fancing Amateur Radio in the Western Hemisphere.

"And now comes the good news that Societies in Region III., notwithstanding the vast distances involved, have established an I.A.R.U. Region III. Division. . . . A dream has at last come true, and I.A.R.U. has indeed become

a live international organisation and not just a name."

In addition, John Huntoon, W1LVQ.

In addition, John Huntoon, W1LVQ, Secretary to the A.R.R.L. and I.A.R.U. Hdq., reports on the matter as follows in issue No. 76 of the I.A.R.U. Calendar, June 1968:

"At mid-year 1988 the major item of interest to organised Annature Hadio of interest to organised Annature Hadio of interest to organised Annature Hadio was completed on a world-wide basis the regional system whereunder Societomer effectively with problems and projects specialised in that area. It was more effectively with problems and projects specialised in that area. It was European Annature, led by the Hadio Society of Great Britain, in efforts Region I. Division, back in 1950.

"The Wireless Institute of Australia felt that the occasion of its federal convention in April might be a suitable basis for convening representatives of Societies in the Region, and through command the suitable of the Property of the President, Robert W. Denniston, WDIX, who was a leader also in the establishment of Region II, attended from the chair the sessions, was requested to chair the sessions, was requested to

"President Denniston extends his sincere congratulations to many Amateurs who had a part in the establishment of the Region III. Division, expresses his deep satisfaction with the spirit of dedication and co-operation which characteristed the meetings, and offers his best wishes for continued strengthening of Amateur bonds in Region III."

As was reported earlier in "A.R.", that form of the executive body of Region III. is somewhat different from that the state of the Directorate of the Sydney confirmed that the confirmed that the confirmed that the Sydney conference has been appointed to act until the next Plenory scheduled for Tokyo in 1971. These Directors of Region III. Division I.A.R.U. are as follows:

W0DX, Bob Denniston, President I.A.R.U. and A.R.R.L.

VK3OR, John Battrick, Federal President W.I.A. JA1BK, Kyoshi Misoguchi, Overseas Director J.A.R.L.

seas Director J.A.R.L.

ZL3AZ, Tom Clarkson, Overseas
Liaison Officer N.Z.A.R.T.

DUIEA, Emilo Asistores, Wireless Institute of the Philippines.

This last Society—W.I.P.—is a new one! At Sydney Emilio represented P.A.R.A.—Philippines Amateur Radio Association, and one of the documents he collected was a copy of a Divisional Constitution of W.I.A. On return to his country, P.A.R.A. and P.A.R.L. (the his country, P.A.R.A. and P.A.R.L. (the amalgamated to form the one representative body—W.I.P., based on W.I.A. lines.

It may seem strange that WODX is a Director of the Region III. Division, however this was the with of delegates by the control of the property of the third of th

Since the conference in Sydney, a Secretariat was formed comprising members of the W.I.A. Federal Executive, viz.:

Chairman: VK3OR (W.I.A. Director). Secretary-General: VK3IZ (Federal

Secretary W.I.A.).

Members:
VK3KI (Federal Vice-President W.I.A.).

dent W.I.A.).
VK3QV (Federal Activities
Officer W.I.A.).
VK3ADW (Federal Intruder
Watch Co-ord, W.I.A.).

The Secretarist is also esisted by VKAVX, George Pither, the IT.U. Islas on Officer of W.I.A. We felt it was wise to keep George's office separate from Francisco and Francisco Comparate from Francisco Comparate francisco Compa

As far as funds of the Region III. Ina bytision are concerned, JARL. Ina agreed to contribute 400,000 Yenapproximately \$1,200 per annum and W.I.A. agreed to contribute \$600 per annum. (Thus \$600 will be recovered from W.I.A. members at the rate of 20 cents pa. per member.)

This matter of funds and finance brings up a quite important point. We as a Secretariat are charged with administering the Division—in terms of policy determined triennially at Plenary meetings, and in between these Plenary meetings in terms of determination of the Directorate. We are also charged with handling funds—the remission of funds from Japan is subject to their Central Bank receiving a copy of a constitution and rules. Our Reserve Bank will also require such a set of Bank will also require such a set of account to the property of the pr

Michael Owen, VK3WI and the members of the Secretariat have drawn up an interim constitution for the I.A.R.U. Region III. Division. This runs to over 50 clauses and has been circulated to the five Societies who have appointed Directors. The preparation of this interim constitution for the Region III. Division, and the ensuing correspondmajor activity since Sydney. Because we on the Secretariat are not prepared, or even able to act unless we are protected by proper rules, we have asked countries to adopt a somewhat unusual approach. We want them to adopt the interim constitution as it stands, and once it is adopted to then amend some of its clauses to improve it. Already certain valid and relevant objections have been raised, which can be the basis for amendment presently, however to get the Division "on the road" we must have some rules-however inappropriate they may seem in certain respects. A position of stalemate may be the outcome if we have to agree to rules in all details before we can act, because we certainly can't act without some sort of constitution!

Why the rush? Already I believe it is felt that W.I.A. was somewhat precipitous in calling the conference earlier this year, and with hindsight it may have been easier to have resolved the constitutional matters in Sydney-even at the expense of a longer conference. I feel that we have two years to do something in the Region to prepare for the next I.T.U. Conference, scheduled for late 1970 or early 1971. Perhaps our 1971 Plenary will have to be held earlier and prior to the I.T.U. Conference! Time may be running out-I hope we don't spend too much of it on polishing up a set of rules, but get down quickly to more active efforts. Emilio DU1EA, W.I.P. Director, does travel the Region in his capacity as Deputy Director of Civil Aviation in the Philippines, and could well make contact with administrations in our Region. I.A.R.U. headquarters has introduced D.A.R.E. (Develop Everywhere) programmes into some countries of the Region. Perhaps the first way we could assist the officers of I.A.R.U. headquarters is to evaluate the efficacy of this programme, and to assist in introducing this elsewhere in the Region.

JARL has ratified the interim constitution and at the same time suggested one amendment; W.I.A. has also ratified the interim constitution, and we await ratification from I.A.R.U. hdg., N.Z.-A.R.T. and W.I.P. When these are received we can invite membership from other countries and really get to work!

other countries and really get to worst. (Members of W.I.A. may be interested to know that JAIFG and JAIBK, who represented J.A.R.L. in Sydney, have made a personal gift of a Yaesu Musen FTDX400 Transceiver to the W.I.A. in appreciation of our hospitality in Sydney. This will be used by

Executive to keep skeds on the Federal Communication Nets and by the Secretariat on the weekly Region III. Division skeds.)

Lat's month, Federal Vice-Pesident reported on the activities of Executive and those at the Wodonga meeting on translators. He went on to refer to the forthcoming space frequency conference. It will be remembered that in the conference of the remember of the ferminal remember of the ferminal remember of the ferminal remember of the few effective violes from Region III. but now, if the laARU, Region III. Division can be made into an effective body, we can of the Region, thus the Amsteur voice can be that much stronger.

DIRECTORS OF LARIJ REGION 3 DIVISION



Top left (L-R): JA1FG, JA1BK, VK3KI, VK5TY. Bottom left (L-R): VK3VX, VK3OV, VK3OR, DU1EA.

Top right: WODX. Bottom right (L-R): VK3IZ, ZL2APC, ZL2AZ.

S.S.B. Transmitter—An Amateur Engineering Project

PART TWO

H. F. RUCKERT.* VK2AOU

CIRCUIT DETAILS

The following circuit details are given with particular emphasis on mistakes made earlier, difficulties experienced and variations tried.

AUDIO AMPLIFIER

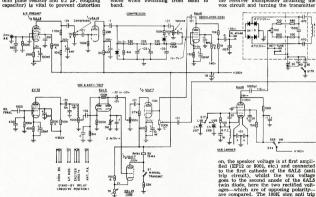
The a.f. amplifier has a gain of about 5,000, because the dynamic mike has only an output of about 2 mV. Therefore shielding of grid 1 and plate leads is necessary to reduce hum pick up is necessary to reduce hum pick up and to maintain stability. The 100 μ F, (10 μ F, was too small) cathode by-pass capacitor of the 6AJB is necessary to prevent oscillation. The low impedance combination at the triode plate (22K ohm plate resistor and 0.1 μ F, coupling capacitor) is vital to prevent distortion "F.) to the ring modulator must also be of low impedance to avoid distor-tion otherwise caused by the voltage dependent non linear load formed by the diode quartet

The a.f. response shaping was there-fore left to the crystal filter and carrier frequency position on the crystal filter response curve (slope), after many experiments, checking with a.f. generator and v.t.v.m. the result at each a.f. stage. This compressor does not cause non linear distortions, as produced by a clipper used in the a.m. rig, if used in a reasonable manner only to prevent occasional excessive drive and flat topping and not to compensate gain differences when switching from band to band.

It can be seen that the compressor gives a far greater speech pulse density and more power per transmitted time interval. The linear amplifier must be able to handle this duty cycle, which means that some of the now popular transceivers could not use a compressor. The power supply would be overloaded and the economy style t.v. valves in the final would overheat too.

THE VOX, ANTI TRIP AND STANDBY CIRCUIT

The a.f. voltage at the plate of the 6BA6 is further amplified in half a 12AT7, and the second half acts as relay valve. To prevent sound from



caused by the non linear voltage de-pendent load of the first Ge diode of the compressor. A 12AX7 twin triode, with 0.2 megohm plate resistor and 0.001 aF, coupling capacitor was quite useless.

A.f. response shaping cannot be carried out in front of the compressor because the compressor a.g.c. action would cancel the effect out. A small coupling capacitor at grid 1 of the 6BA6 cannot be used because the 50K ohm volume control setting would become frequency dependent. The plate load (1K ohm) and coupling capacitor (0.5

Speaking the vowels with apparent identical loudness and with similar pitch into the mike at first without,

Vowel Spoken	Exciter Output without Compressor	with Compressor
A	60	60
E	16	40
1	6	44
0	24	60
U	4	36
'QST," Febru	uary 1963, W3ZV	N.

and then with the compressor 50% in,

grid voltage of the relay triode (half 12AT7) is zero or slightly negative, and the relay will stay in the receive posi-When the op. talks into the mike, the grid of the relay valve becomes positive, and the valve draws more plate current, which operates the relay turning the transmitter on. There is,

volume control (between EF12 and 6AL5) has to be so adjusted that the

identical receiver speaker sound picked up the mike and the one amplified by the anti trip af. stages develops a similar but opposing voltage at the plate of the 6AL5. In this case the of course, some interaction between mike signal input strength, compressor and a.f. gain control setting, 100K ohm 6AL5), the 3 megohm time constant control, the anti trip level control and the relay valve hias, current level and relay sensitivity. The correct settings have to be found experimentally:

(a) Set valve bias (1K ohm) without speech or anti trip voltage so that the standby relay is only just still in re-ceive position (resting). About 5-6 mA.

go through this relay.

(b) Set compressor gain (1 megohm lin.) and modulation gain (50K ohm log.) for the usual speech level to obtain sufficient and linear drive.

(c) Open up the vox control (100K and time constant control (3 megohm) to obtain fast enough and sufficient vox action, e.g. positive relay valve grid voltage compared with the cathode potential. Use S1 to operate the transmitter.

(d) Set anti trip level (100K ohm) so that sound from the speaker cannot trigger the relay and transmitter action. ing voltage of four valves is then reduced when netting) (c) Grid 1 bias changed from a.l.c.

-50 volts blocking voltage, or the limited blocking voltage for netting. (d) Controlling the antenna relay (96v. x 40 mA.) from the negative bias supply of the p.a., which also turns on/off the screen grid voltage of the p.a. valves to disable the linear am-

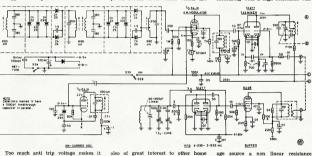
plifier in receive position under all conditions. This relay is a 220v. a.c. 27 mA. relay, but it caused too much buzzing noise when a.c. operated. The relay must not click too loud when it falls back into the receiving

tx on via the vox system, and this on/off action repeats itself so that the tx is out of control

Typical operating voltages are shown on the circuit diagram and the valve pin connection circles. This is extremely helpful if trouble shooting has to be done, because one can quickly see or measure how many volts the various points should have. These values are identical forward resistance." You must be very lucky if this is all you have to know about the ring modulator to make it work correctly. The circuit first used was published by an Amateur magazine. It used a triode crystal caroscillator without buffer, link coupling from the plate tuned circuit, 5v. r.f. r.m.s. to the ring modulator balancing resistor, putting 3.5 volts on the diodes. Many other circuits found in the literature did not mention the recommended r.f. voltage the diodes should obtain.

The higher the r.f. level at the ring modulator (with carrier effectively cancelled out), the less amplification is needed in the following stages, which means less instability difficulties, less hum and better carrier suppression. One may assume that Ge diodes with 100 volt inverse voltage are safe at the 3 to 5 volt r.f. level. These diodes can often take 100 mA. pulse current, so my diodes looked okay. The ohm meter test to select matched

groups of diodes is extremely crude, measuring with a high resistance volt-



impossible for vox to turn the trans-mitter on, unless the op. shouts too which may cause distortions. lond. Switch S1 off.

(e) Manual rx-tx operation: Turn

vox control low and use standby switch S1.

A stiff regulated B+ source had to be used for the plate supply of the relay valve with the current going through the 5,000 ohm relay winding, or the relay used did not obtain suf-ficient power (80v. × 6 + 10 mA.) to operate all contacts in a reliable manner. A more sensitive relay would be desirable.

Standby relay contacts:

(a) B+ on/off in receiver affecting r.f. stages and mixer but not the oscillatore (b) A.f. input on/off to ring modula-tor, to prevent modulating the exciter when netting. (The exciter grid blockconstructors, to compare their values with those others used.

RING MODULATOR AND CARRIER OSCILLATOR

We can find quite a number of different balanced modulators in the literature. I chose the ring modulator (diode quartet) because commercial communications apparatus used and still use this method very successfully. The apparent simplicity seems the season why the Amateur literature brings out very little about the finer points of this circuit, and it was here that I struck serious difficulties (distortion) after checking a long list of pos-sible other sources for the trouble. Stages were reconstructed and the circuit was many times modified The book says: "Select four diodes with the help of an ohm meter which have a high inverse resistance and

age source a non linear resistance, which is load and temperature sensi-tive, can be tricky. The only truely matched diodes can be found by testing the full dynamic voltage range, using the finally applied load resistance and current and the same temperature and frequency. This is easier said than done, because the load resistance for each diode is formed by the three other ring connected diodes, which are volt-age, temperature and frequency (its capacity changes) dependent. Attached L. C and R add to the complexity.

After four diodes had been found which gave, under certain conditions, a good carrier cancellation of over 40 db., it was observed that the balancing potentiometer (100 ohm carbon moulded track) had to be reset after a few words had been spoken into the mike, or after the other carrier crystal had been switched in which gave a different r.f. output. New balance was only obtained after the plate circuit of the carrier oscillator had been retuned (this was the old circuit). The balancing trimmer had also to be reset. This made l.s.b. to u.s.b. changes rather

complicated. Using the XYLs hair dryer showed that the balance was temperature affected, and a thermistor was tried in one of the resistor lines to obtain automatic compensation. Using the BC211 frequency meter as an s.s.b. re-ceiver revealed that the non linear and greatly fluctuating load (the and greatly fluctuating and greatly fluctuating load (the diodes presented) caused f.m. of the 414 Kc. carrier crystal oscillator, which did not sound like s.s.b. Changing the carrier oscillator valve to pentode operation in an e.c.o. circuit with 330 ohm plate resistor (no more L and C circuit) and using a 1,000 pF. coupling capacitor to the ring modulator solved problem and plate circuit the f.m.

tuning difficulty. Care must be taken that the l.s.b. and u.s.b. crystals give the same r.f. voltage or the balancing is not identically good when switched from 80 mx 1.s.b. to 20

mx u.s.b. operation, Earlier an a.f. transformer (50:1) and r.f. chokes were used between the 6BA6 and the ring modulator. Matching difficulties were first suspected, but 100 c/s. hum pick up by the chokes and the transformer was identified as the trouble source. Every low a.f. input note gave two a.f. output signals behind the filter.

The reports on s.s.b. quality were still conflicting; some said it sounds okay, others said that the first CQ call or so was clear but later distortion developed, some claimed that they could not resolve the signal at all (only local stations), etc. Listening to one's own transmission (speech) is mislead-ing and a tape recorder becomes very

useful to check what goes on

None of the many helpful suggestions offered by friends proved to have hit the spot. Several other difficulties only occasionally) occurred in the following stages (later discussed) were eventually identified and cured, but the modulation was still no good. This transmitter had an unusual sick-ness, so it appeared. I mention this in detail, because it shows that copying a circuit without understanding it may sometimes not work at all. A dis-cussion with a physicist, who had made good Ge diodes, including those for ring modulators, did teach me that the smallest components are apparently the most complicated ones.

Soon after, on the first hot day (95° F.), followed a lengthy experiment, which heated the rig up (no cooling fan was installed at that time), a QSO was made, when it was observed that the output fell. More a.f. gain brought it back but only for a moment. The carrier became stronger, the gain fell back and distortions resulted. From these circumstances and meter readings, it became clear that the ring modulator diodes had packed up. As we often experience, extreme conditions revealed the trouble spot.

Diode data was now obtained, more informatory than the few handbook values. A diode quartet was attached to a filament transformer with voltage taps and the current in the ring was measured versus a.c. voltage across

opposing ring positions. V. A.C. mA. D.C. 1 0.4 2 3.5 8

at 25°C. It was now obvious that the safe current and power ratings of the diodes had been exceeded, especially at high

operating temperatures. The problems mentioned earlier wer now quickly solved by installing Si diodes, which had very uniform characteristics, lower forward resistance and higher inverse resistance than the various types of Ge diodes tested so far. They can easily take the temperatures involved without runaway effects or The carrier voltage across each diode was reduced to 0.5v. r.f. r.m.s. The carrier cancelling potentiometer (100 ohm) and trimmer (30 pF.) do no longer require re-adjustment and

are not needed at the front panel. The diodes for ring modulators must be dynamically matched. Suitable Ge diodes are those for low impedance load (not the f.m. types). These diodes draw usually 15 mA. with lv. d.c. The r.f. voltage has to be kept low if >25°C.

(77°F.) ambient temperatures are used. Published circuits which do not show all important voltage values are not very helpful to train Radio Amateurs.

THE CRYSTAL FILTER

Following similar frequency steps as used by a well known U.S. manufacturer, I had decided to build a crystal filter at about 400 Kc. using surplus FT241 crystals. An excellent paper by DJ2KY* described a simple method. The accompanying table shows crystal channel numbers and frequencies.

Within each bracket is a group of crystals with frequencies symmetrically spaced above and below the value of the centre crystal (channel number).

I used group No. 7 for my filter. Both filter sections use the same No. 23 and 24 bridge series crystals. The -6 db. filter bandwidth is about 50% wider than the oscillator frequency spacing of these crystals, which is just right, 6 "DL-QTC," August 1951.

FT241 CRYSTALS-Channel Nos. 0 to 79 and 270 to 375

	Fund. Freq. Kc.	Channel No.	Fund. Freq. Kc.	Channel No.	Fund. Freq. Kc.	Channel No.
	370.370 372.222 374.074	0 1 2	420.833 422.222 423.611	28 304 305	470.833 472.222 473.611	55 340 341
	375.000 375.962 376.388	3 271)	424.074 425.000 425.926	29 30 9	18 474.074 475.000 475.926	56 342 57
	377.777 379.166 379.630	272 273	426,388 427,777 429,166	307 31 308 309	476.388 477.777 479.166	58 344 345
	380.555 381.481 381.944	6 275	10 429,630 430,555 431,481	32 310	479.630 480.555 481.481	59 346
	383.333 384.722 385.185	7 276 277	431.944 433.333 434.722	34 312 313	481.944 483.333 484,722	347 61 348 349
2 1	385.111 387.037 387.560	278 9	435.185 436.111 437.037	35 314 11	20 485.185 486.111 487.037	62 350
	388.888 390.277 390.741	10 280 281	437.500 438.888 440.277	315 37 316 317	487.500 488.888 490.277	64 352 353
	391.666 392.593	12 282	12 440.741 441.666 442.593	38 318	490.741 491.666 492.593	65 354
	393.055 394.444 395.833	13 284 285	443.055 444.444 445.833	40 320 321	493.055 494.444 495.833	355 67 356 357
1	396,292 397,222 398,148	14 286 15	446.296 447.222 448.148	41 322 13	22 496.296 497.222	68 358
l	398.611 400.000 401.388	16 288 289	448.611 450.000	323 43 324	498.148 498.611 500.000	69 70 359
	401.852 402.777 403.704	17 18 290 5	14 451.888 451.852 452.777	325 J 44 326	501.388 501.852 502.777	71 362
	404.166 405.555 406.944	19 292 293	453.704 454.168 455.555	45 46 327 48 328	503.704 504.166 505.555	72 363 73 364
6	407.407 408.333 409.259	20 294 21	456.944 457.407 458.333	329 47 330 15	506.944 507.407 24 508.333	74 366
	409.722 411.111 412.500	22 296 297	459.259 459.722 461.111	48 331 49 332	509.259 509.722 511.111	75 76 368
	412.963 413.888 414.815	23 24 24 7	16 462,963 463,388	333 J 50 334	512.500 512.963 513.888	77 370
	415.277 416.666 418.055	25 300 301	464.815 465.277 466.666	51 52 335 52 336	514.815 515.277 516.666	78 371 79 372
8 4	418.519 419.444 420.370	26 302 27	468.055 468.519 469.444 470.370	53 53 54	518.055 519.444 520.833	373 J 374 375

The shunt crystals, No. 22 and 25, again evenly spread from No. 286 (centre) are the properties of the shunter of the spread from the spread f

The filter response curve shows that this filter is as good as required and as good as the best we can find in Amateur equipment. The shielding between filter sections and input to output circuit has to be extremely good.

The crystal frequencies finally used (see Table 1) differ slightly because most of these crystals and service most of these crystals are service or coded electrode to wire solder connections, which are difficult to repair, and checked, or the filter will never or only intermittently work. Additional crystals were obtained via the extreme-corner of the crystal brought them to the desired spot frequency.

Channel No.	Measured Kc.			
295	409.720			
2 x 22	411.240, 411.180			
297	412.590 Carrier			
2 x 23	413.212, 413.190			
298	413.705 Centre			
2 x 24	414.736, 414.856			
299	415.495 Carrier			
2 x 25	416.740, 416.835			
301	418.060			

Table 1.

FILTER TESTING

(a) The gdo. was equipped with a coil and parallel capacitors to cover the range 414 ±5 Kc, using a large 100° knob. This range was curefully meter. The gdo. feeds into the input coil of the fifter, the other coil end is earthed. A vi.v.m. measures the coil of the fifter, the other coil end is earthed. A vi.v.m. measures the coil of the fifter, the other coil end is earthed. A vi.v.m. measures the coil of the fifter the coil tuning at the centre frequency. Check slope and side loke extent set the gdd and plate of the 6A.18 valve have to be carefully adjusted to obtain a fast top curve, or the audited to people a fast lower than the curve of the coil of the fast lower than the curve of the coil of the fast lower than the curve of the cu

(b) Plug No. 298 crystal in carrier oscillator, switch S2 to "netting", measure drive with exciter r.f. output voltmeter (included), peak all six 414 Kc. filter coils.

(c) Connect an audio signal generator to the microphone jack, switch s.s.b. carrier on, measure r.f. output at the exciter, replace driver pi output capacity (from p.a. valves) with a 60 pt capacitor (a 14 cap. voltage divider may be needed, if a Ge diode r.f. probe v.t.v.m. is used). Check driver r.f. output versus a.f. input. It may have been noticed that the carrier frequencies are further away from the original No. 297 and No. 299

crystal frequencies. This was necessary to avoid too much base (from the op's voice and dynamic mike) from passing the filter.

This effective way of audio response shaping has the advantage of further suppressing the carrier and unwanted

shaping has the advantage of further suppressing the earrier and unwanted sideband. The excellent filter shape (-6 db.) = 1.88] allowed a carrier suppression of >40 db. on the filter query can have remarkable results as far as voice intelligibility is concerned. The smaller the bandwidth (less troble) again the tape recorder is very helpful for comparing the operator's voice:

- (a) Recorded with hi-fi mike.
 (b) Recorded with DX mike, or what
- have you.

 (c) Recorded with a.f. taken from behind each a.f. stage.
- (d) Recorded and received voice taken after each r.f. and mixer stage and from the p.a. operating the linear final into a dummy load.

THE A.M. MIXER (MODULATOR) The 6AJ8 valve following the crystal filter has a dual function.

SS.B.: Amplifying the s.s.b. signal to the maximum level the first mixer can handle, because high gain is easier obtained at 414 Kc. with 2.5 Kc. bandwidth than at 28 Mc. with 500 Kc. bandwidth than at 28 Mc. with 500 Kc and the signal of this stage is needed. Of the sain of this stage is needed. A.M.: The oscillator B+ and the af. is switched (S3a/b) to this 6AJ8 valve.

is switched (\$3a/b) to this \$A.38 valve. The triode works as am. carrier oscillator valve and a fraction of a volt controls grid 3 of the heptode section. Af. voltage from a separate volume control (200K ohm log.) reaches via switch \$3b grid 1 of the heptode. The am. carrier can be keyed for cw. operation or to test the final with max. drive.

The valve holders of valves carrying rf. voltage are all mounted on top of the chassis, standing on their centre shield, and the "no r.f." carrying contact lugs are soldered to 1,000 pF. feed-through capacitors to simply shielding and to keep all r.f. out of the below chassis space. Capacitors marked with X are in parallel to these feed-through capacitors.

FIRST MIXER AND V.F.O.

The left triode of the 12AT7 mixer valve is the actual mixer with cathode injection of the oscillator (v.f.o.) volitage. The other triode has grid injection of the same oscillator with the control of t

It is very interesting to check with an absorption wave meter how well unwanted mixing products and the carrier are suppressed, because the following fixed tuned and damped wide band circuits are far less discriminating. Tapping the mixer plate half way down the coll helped too. The ganged air capacitor tunes from 4.450 to 3.950 Mc. with a 90° rotation. The v.fo. voltage is 20 times or more the s.b. mixer input signal, which helps to reduce mixer distortion.

to reduce mixer distortion. the Frankin oscillator are well known. The air capacitor used (20 years old) has a frequency linear out rotor (if a special tion of the right coil and worm reduction gave drive (ex. U.S. aurplas) and consideration of the right coil and worm reduction gave drive (ex. U.S. aurplas) and adjusted that the numbers represent the kilocycle to be added to the lower band eage, e.g. direct digital frequency required to get this feature right.



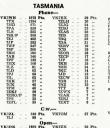
VFO (chassis open): The special stator cut of the air capacitor, to achieve frequency linear tunin is visible. Notice and stator are machined from a block each and have quartz insulation. The worm gear drive has split gears, spring loade. The coil wire is glued to the caramic former, the chassis is free for the separate c.o. of the t

Differential ± temperature drift compensation is included which maintains the total capacity but allows to the property of the compensation of the

than the one in the BC221 frequency meter. A buffer stage with the 6AoS valve follows. The buffer output is matched with a link coil to the two feet long co-axial cable and mixer resistance. The output voltage lies between 2 and 3v, which is about right for the typical 12AT7 mixer circuit. The v.f.o. frequency range is 4.036 to 3.536 Mc.

Earlier an unexpected beat note and signal was observed. It was found that the balancing triode of the mixer started to oscillate (tuned grid-tuned plate) using the buffer plate circuit as grid tuned circuit. The 50 ohm grid stopper prevented the trouble finally. The property of the property of the trip of the property of the trip of the plate of the property of t

TA	SMANIA WINS I	R.D.
Congratulations to VK7 for their well deserved win. They had the high-	Open—	SOUTH AUSTRALIA
well descrived win. They had the high- est participation, highest ever top-six log average, and the highest State score since VK5 won with 5707 in 1964.	VK2BO 1227 Pts. VK2EL 466 Pts. 2DO 1161 2BNA 315 2BVA 315 2BVA 315 2BVA 315 2BVA 315 2BVA 315 314 2BVA 314 315 314 315 314 315 315 315 315 315 315 315 315 315 315	Phone— VK5FO 1330 Pts. VK5PC 73 Pts. SFT 1967 SGF 65 SBI 1021 SKF 63
An analysis of the last eight years' top logs shows that 1968, under the present scoring table, proved to be the best year, with all States' top logs scoring over 1,200 points. V&7DK's tally of 1822 points for 182 hours of operating could stand as a record for some time.	VICTORIA Phone— YKSVK 1831 Pts. VKSALJK 229 Pts. VKSVW 1648 Pts. VKSALJK 229 Pts. 3AARD 1649 " 3AAD 223 " 3AAJW 1655 34QZ 197 " 3AAW 21 " 3AWW 172 " 3AWW 21 " 3AWW 172 "	SUC ST ST ST ST ST ST ST S
Band conditions were most favour- able with many logs showing numer- ous 10 metre contacts. S.s.b. usage also was noticeably predominate, and, because of it, the bands appeared able to cope with the station pile-ups that occurred without the mutual interfer- ence known of old.	SEV TO TO TO	SWG 301 SZKK 29 SLZ 280 SFZ 27 SZK 386 SZE 27 SGN SSE 23 24 SGN 204 SSH 23 SNH 168 SZH 22 SDS 154 SPT 22 SDS 144 DDF 20 SUA 30 5ZKG 17 SUA 139 SZKG 17
Once again congratulations to Tasmania for a fine effort and we hope that next year all States will put up a good fight, trying to win. Neil Penfold, F.C.M. for F.C.C.	3AUN 276 3ZWJ 13 3ASQ 272 3AER 12 3HE 243	SLQ 134
[See Analysis of R.D. Results after Listeners' results.—Ed.]	VK3APJ 638 Pts. VK3RJ 126 Pts. 3XB 634 31B 88 3OP 563 3AXK 84 3QK 401 3KS 43	VK5AU 251 Pts. VK5OR 90
DETAILS OF STATE SCORES % Average	3ABR 396 3AAL 40 3APN 331 3AKT 17	SFM 124 SJG 18 SLD 106
Log Licen- ticic Six State State Entry sees pation Logs Points Score VK2 72 1,744 4.1 1,114 21,407 1,998 VK3 60 1,702 3.5 1,041 20,689 1,771	Open— VK3ASW/P 1088 Pts. VK3QI 109 Pts. 3AKS 724 , 3VF 150 ,, 3QV 562 ,,	Open— Open— VK3GW 1238 P1s. VKSWI 119 Pts SCV 979 5QR 84 5LN 980 5NK 80 5WO 444 5RK 60 5WO 457 5ST 15 5XV 287 5ST 15
VK4 60 661 9.0 1,102 18,546 2,771 VK5 85 720 11.8 1,132 19,251 3,373 VK6 83 424 19.6 1,115 18,809 4,795	QUEENSLAND Phone—	WESTERN AUSTRALIA
VK7 65 217 30.0 1,294 13,577 5,367	VK4WW 1129 Pts. VK4XN 48 Pts. 4LB 1034 4XC 45	Phone— VK6XX 1419 Pts. VK6ER 50 Pts.
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NEW SOUTH WALES (Award Winners in Bold Type)	1	CRY 648 GOH 33 GOH 33 GOH 648 GOH 33 GOH 648 G
Phone— VKYYN 1101 Pts. VK7APP 183 Pts. 2XT 672 125 166 2ANO 859 2AIC 162 2BGF 855 2RV 142 2AFD 711 2SS/M 142 2SJ 620 2BLF 123 2AGF 618 2EU 118	HJJ	6CN 285 6ZCW 25 6XW 277 6CD 23 6WL 270 6ZGP 22 6FG 245 6KH 21 6XO 214 6ZBV 21 6NM 159 6ZGO 21
2AGF 618 2EU 118 2AGV 605 2HQ 97 2AGV 605 2HQ 97 2AGV 65 2 2HQ 87 2AGV 65 2 2AGV 67 2A	4HB 187 4GT 18 4CZ 185 4KS 18 4LN 112 4SF 18 4XJ 109 4FT 15 4HW 98 4ZTL 15 4AV 22 4ZAI 13	6MO 130 6ZFD 90 6RX 128 6ZED 19 6KJ 117 6ZKR 18 6KM 107 6ZKR 18 6KM 207 6ZPC 15 6KB/P 22 6ZPC 15 6KB/P 32 6ZPC 10
2ADA 220 2AVT 37 2VG 278 2 2AV 34 34 2AVZ 278 2 2AV 2AVZ 278 2 2AV 2AVZ 278 2 2AVX 247 2 2AVX 247 2 2AVX 247 2 2AVX 247 2AVX 241 2AVX 241 2 2AXX 241 2 2AX	4GC -88 -4NG 10 4FJ -86 -4NZ -8 4EB -11 -4ZEC 5 4EB -71 -4ZEC 5 4EC -55 -4ZEC 5 4EF -54 -4ZEC 5	6TX - 78
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LISTENERS' SECTION

Papua-New Guinea R. Stewart 376 ANALYSIS OF R.D. RESULTS

South Australia

S. Ruediger P. Field

Ton Six Logs for 1968 1227 Points 399 Contacts

SFO SRU 1822

Top Log Scoring

VK2AHH/1011 3APJ/971 4UX/938 5NO/1227 6RU/1105 7RX/971 VK2AHM/1215 VK2AHM/1218 3ALZ/813 4RH/756 5MS/1286 6RU/889 6RU/889 7MS/735 VK2AHM/1089

1963 VK2AHM/1205 3ALZ/826 4DJ/778 5ZP/1440 6CL/807 7AI/657

1965 VK2AHM/1116 3MO/1068 4RH/1091 5NO/1226 6RY/759 7DK/938

1967 VK2BO/1037 3MO/1341 4RH/1329 VK2AHM/1304 3VK/125 3MO/1273 4RH/1369 5EF/916 6RU/1365 7SM/1290 5FO/1350 6RU/1651 7DK/1825 Total Log Entries 1961 Total Licensees

ŵ **ERRATA**

Readers are asked to note the following corrections to "A Table Top S.s.b. Transceiver for Six Metres," Sept., "A.R.":— 1968.

468, "A.R.":—
1 Coupling capacitor between plate of V9 and grid of V10 omitted. Its value is 220 pF.
2 The 20 pF. drift adjust capacitor is a N750 not NPO.

The 0.001 uF. capacitor from the a.l.c. line to earth should be 0.1 uF.

4. The 6BE6 mixer screen resistor should be 25K 1w.

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Listed below are the highest twelve members in each section. Position in the list is determined by the first number shown. The first number represents the first number of the list of the list of the list is determined by the first number shown are continued in the list of the

Credits for new members and those hose totals have been amended are also shown, BHONE

VK5MS VK3AHO VK6RU VK6MK VK2JZ 315/338 312/326 307/332 304/323 303/320 VK5AB VK4FJ VK4TY 282/301 275/278 VK3TL VK2AAK 271/277 268/273 Member VK3JW VK3OR VK1VP Cert. No. VK2QL VK3AHQ VK3YL VK3ARX 300/322 292/306 289/312 VK3TL VK4UC

OPEN VK2AGH VK4HR 311/331 309/333 309/334 VK4TY VK4FJ VK3ARX VK3TL VK3XB VK2APK

New Member: Cert. No. 113 VK3AMK 139/139

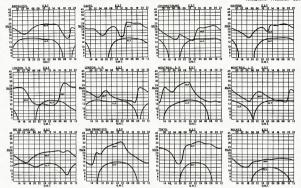
VK4UC VK4PX

D.X.C.C. members will notice that nearly all scores have been amended this month. Please refer to this month's Federal Awards Notes for information relating to additions and deletions.

296/320 289/298

PREDICTION CHARTS FOR NOVEMBER 1968

(Prediction Charts by courtesy of



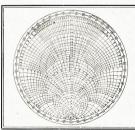
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INDUSTRY
 COMMERCE
 RESEARCH
 PLANNING

PROJECT-SOLID STATE TRANSCEIVER

PART ONE

H. L. HEPBURN,* VK3AFQ, and K. C. NISBET,† VK3AKK

PROLOGUE

In this series of articles, which will be spread over the next five or six issues, it is proposed to describe a series of transistorised modules which can be used to build up anything between a simple detector/audio system and a multiband s.s.b. transceiver.

Unlike a lot of projects which seem somehow to evolve, that to be described was started by the writers nearly twelve months ago with some very clear objectives in mind.

clear objectives in milos dorabbin' receiver project in 1986, and the series of h.f. and vh.f. converters which followed, it was apparent that the followed, it was apparent that the equipment was something that was wanted and the decision was taken to aim for a much more comprehensive transactiver which would equal—or even better—anything currently avail able over the counter. Yet somehow earned cash which is usually associated with going "commercial".

The design had not only to be technically advanced, but the product had to be capable of being "kitted" and each module had to be sufficient in itself so that it could be used for purposes other than that for which it was primarily designed. It also had to be which we are available in Australia. It is our belief that the project to be described meets all these objectives.

GENERAL

Fig. 1 is the block schematic of the complete equipment. Each function is numbered and these numbers are used in the description that follows. Note that each block does not necessarily indicate a separate printed circuit board since in some cases several functions are combined on one board.

Let us start by assuming that one wishes to build a simple 80 metre receiver capable of doing a first class job of receiving sideband. The minimum number of functions that must be employed are:—

(a)	Mixer			Function	2,	Fig.	1
	Filter			**	3	,,	1
(c)	I.F. Amp.			,,	4	,,	1
	Prod. det.				5	**	1
(e)	Local osc.			,, 1		**	1
(f)	B.F.O				7	**	1
(g)	Audio ou	tp	ut	**	8	**	1

If an i.f. of 9 Mc. is chosen then the v.f.o. must cover 5-5.5 Mc. in order to cover a signal frequency range of 3.5-4.0 Mc.

Using the same v.f.o. the 14.0-14.5 Mc. band can be covered simply by adding another set of coils in the signal frequency part of the mixer. The band will tune the other way round, but this may be no real drawback.

*4 Elizabeth Street, East Brighton, Vic., 3187.

Usually on the higher frequencies it is desirable to have some sort of rf. amplification—even if only to confer a low noise characteristic and provide some additional signal frequency selectivity. Thus adding function No. 1 at a later stage will achieve these objectives.

To extend to other signal frequency ranges, several courses of action are possible:

A basic tuning range (say 3.5-40 Mc.) can be used and other signal frequencies "converted" to this tuneable range by the addition is the method which was used in the original "Moorabbin" project. However, the need to get the selective filter as close as possible to the selective filter as close as possible system.

Thus the later addition of function I2 and 14 in Fig. 1 canbles the basic one or two band receiver to be made into a multiband affair. Note that the additional bands added need not be on Amateur frequencies. Note, too, that all bands will tune at the same rate, will have the same calibration and the same stability. By proper choice of the band can be automatically selected.

To transform either the single band or multiband receiver into a transceiver it is necessary to add other functions. It is necessary to add other functions and the state of around the l watt peak. Function 20, the p.a., can be added to raise the output to the 15-20 watt peak level or the lower output used to drive a conventional valve linear.

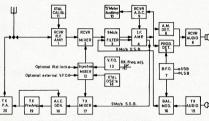


FIG. 1. - TRANSISTOR- 4 BAND-TRANSCEIVER - BLOCK DIAGRAM.

- ii. A multi-frequency v.f.o. can be used which is switched to cover the required injection frequency range for each band. Apart from the property of the pr
- iii. The output of a single range v.t.o. can be mixed with that from a crystal oscillator to produce the required mixer injection frequency of the control of the control of the control of the injection mixer, this system that the control of the injection mixer, this system flexible and allows additional signal frequency ranges to be covered as focultied without remaking the control of the cont

Adulo from the tx audio function (18) is mixed with the output of the modulator (18) is mixed with the output of the modulator (18) to give d.s.b. output on 9 Mc. This d.s.b. signal is then passed through the existing filter (3) to result of the control of the

Since the v.f.o. and b.f.o. are common to both receiver and transmitter, a transmitted signal will be on exactly the same frequency as that being received. It will also be on the same sidehand Other features which can be added (and some are incorporated in the finished design) are rx a.g.c., tx a.l.c., finished design) are rx a.g.c., tx al.c., S meter, external vf.o., external crystal lock, rx calibrator or a.m. noise limiter. A good simple noise limiter has not yet been found by the writers.

Thus the total design makes it possible to start with a simple basic receiver, get it going on one band and add modules as time and money permit to expand, first to a multiband re-ceiver and then to a multiband transcoiver

It is further possible to use the mod-ules to "tailor" a specific requirement. For example, by using a simple crystal oscillator in place of the injection chain (12, 13, 14) one could produce a single fixed frequency receiver, or trans-mitter or transceiver for W.I.C.E.N. or other net use. Provision has been made for such external injection as well as for a second v.f.o. to permit split frequency working.

Table 1 shows some of the possibilities inherent in the modular approach by listing various "end products" by listing various "end products" and the functions necessary to achieve them. The table is by no means com-plete and (within reason) the number of possibilities is limited only by the imagination. The writers will be pleased to talk over other possible combinations with anyone interested.

End Product

3.5 Mc. transmitter/receiver ...

3.5/14 Mc. transmitter

Spot frequency receiver

"Front end" for an existing rx

9 Mc. s.s.b. generator

QRP c.w. transmitter (v.f.o.) ..

"Q5er" back end

A.m. modulator pre-amp.

Four-band receiver

3.5 Mc. receiver

FEATURES

Frequency ranges:

(i) 1.8 to 2.3 Mc. (ii) 3.5 to 4.0 Mc. (iii) 7.0 to 7.5 Mc. (iv) 14.0 to 14.5 Mc.

(v) Provision made for optional addition of 21.0-21.5, 28.5-29.0 Mc. or any other two 0.5 Mc. bands

I.f. Frequency: 9.0 Mc.

V.f.o. range: 5.0 to 5.5 Mc.

V.f.o. range: 5.0 to 5.5 Mc.

Tuning: 0.5 Mc. per band. All bands
tune in the same direction at the same rate. Generator type: Filter uses a Pye 9-0A

crystal filter. Tx output: 15 watts p.e.p. into 50 ohms.

Sideband selection: Automatic. Other sideband selectable. Power supply: 12v. d.c. (or 230v. a.c. with suitable power pack). Rx audio output: 1.3 watts into 8 chms.

Rx sensitivity: Better than 0.5 micro-volts, 30% a.m. modulated. Rx noise figure: Better than 3 db, at

a handwidth of 2.8 Kc. Drift: Better than 50 cycles per hour. Other features:

(i) Provision for external v.f.o. (ii) Provision for crystal lock. (iii) A.m. noise limiter. (iv) Uses Eddystone dial but will

accept less exotic ones.

(v) Rx vernier tuning.

Function Used

1, 2, 3, 4, 5, 8, 9, 7, 13, 15, 16, 17, 19, 20

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14

1, 2, 13, 3, 4, 5, 7, 8, 9

15, 16, 7, 3, 4, 17, 13, 19, 20

1, 2, 14, 3, 4, 5, 7, 8, 9, 10

12, 13, 14, 17, 19 (+ 20)

is of either American or Japanese origin. Both of these countries use a d.c. input method of rating sideband transmitters and the specifications (and advertising!) refer only to d.c. input. Depending on the particular mode of operation in which the p.a. is run, the operation in which the p.a. is run, the peak output of commercial gear may be as low as 30% of the d.c. input. Thus a transmitter rated at 100 watts peak d.c. input may well only give 30-35 watts of peak r.f. at the antenna. Thus the 15 watts peak output cap-

ability of the present design is not one would get from valve equipment using a single tube in the p.a.

It is certainly possible to get more than 15 watts from a single transistor, but for multiband operation (as distinct from single spot frequency operation) the problems of matching a transistor output impedance of a quarter ohm or so into a 50 ohm antenna are rather frightening. An attempt to work out the circuit constants (and switching) for a four-band h.f. rig giving 50 watts of output and running off a 12 volt rail will soon indicate the size of the problem. The 15 watts output level was finally

chosen because-(a) It simplifies matching problems.

(b) It is quite adequate for "bare-foot" operation.

(c) It is more than sufficient to drive an AB or AB2 valve linear to the full allowance of 400 watts

peak output.
(d) It allows safe operation of the p.a. transistor even with the antenna disconnected.

(e) It can readily be obtained from available transistors off a 12 volt rail (f) It is - in general - compatible

with the concept of portable equipment.

5. 6. 8 15 Table 1.-Function Combinations.

1, 2, 12, 13, 14

15, 16, 7, 3, 4

The grouping of functions on to printed circuit boards is as follows: (a) Rx r.f. amplifiers and mixers— Functions 1, 2. (b) 9 Mc. filter unit-Function 3.

(c) Rx i.f. amplifier and a.g.c.-Functions 4, 9.

(d) A.m. detector, a.m. N/L, prod. detector—Functions 5, 6.

(e) Rx audio, squelch, C/O relay— Function 8.

(f) V.f.o. (in die cast metal box)-Function 13. (g) Injection oscillators and mixers -Functions 12, 14,

Tx audio-Function 15. (h) (i) B.f.o./balanced modulator-Functions 7, 16.

(i) Tx mixers, pre-amplifiers and a.l.c.-Functions 17, 18, 19.

(k) Tx p.a.—Function 20. (l) Rx crystal calibrator—Function 11 Having covered the general concept

of the design, and shown some of the or the design, and shown some of the possibilities inherent in it, the description will now become more specific. Comments in all cases refer to the completed unit. With the exception of the v.f.o. and tx p.a. all printed circuit boards are $4\frac{1}{2}$ " x $2\frac{1}{2}$ " and use a glass epoxy substrate. $\frac{1}{2}$ " is left uncoated at each end

for mounting purposes.

The completed unit is contained in a metal cabinet approximately 15" x 8" x 11" deep. If sufficient interest is shown, consideration will be given to

organising a supply of the metalwork. Wide use has been made in the cir-cuitry of Motorola MPF102 single gate FETs and R.C.A. 3N140 dual gate FETs. These are obtainable from Cannon

Electric and Radio Parts respectively. Other transistors used are either Mul-lard or Fairchild. All other components are standard items and can be obtained in Australia. The specification of an output power of 15 watts peak may cause some com-

ment. It is certainly worthy of some. In Australia, although sideband transmitters are rated on output, there are still a very large number of Amateurs who still use the older d.c. input term-inology. The reasons for this are understandable since most of the commercial equipment sold in this country

DESCRIPTION OF MODULES Receiver Audio Module (Function 8, Fig. 1) The audio end of any transistorised

equipment is-on the face of it-the simplest.

However, quite a number of circuits were tried before settling for that shown in Fig. 2. This circuit is essentially the one described in the Fairchild Applications Brief No. A002, the only additions being the transistor associated with the base circuit of the AY1121 driver. Full acknowledgment is made to Fairchild for the use of this circuit. Under quiescent conditions the emitters of the output pair are held at positive excursions of the input signal the AY6108 conducts and drives the speaker through the 250 uF. capacitor. The AY6109 drives it on negative excursions. At very small signal levels an appreciable portion of the power delivered to the load passes through the 560 ohm resistor. The AY1120 and AY1121 form a high gain direct coupled voltage amplifier to drive the output pair, 100% feedback through the 2.2K resistor accurately establishes the quies-

cent point of the output pair.

The 470 ohm resistor between the AY6108/AY6109 emitters and ground reduces cross over distortion at low Amateur Radio, November, 1968 signal levels, while the 150 ohm resistor in the AY1121 emitter/ground path establises the sensitivity of the unit.

The 0.1 uF. condenser across the supply rails prevents oscillation if the impedance of the supply is excessively high (e.g. dud batteries).

The unit can be operated at rail voltages of between 9 and 20 volts

without modification although of course the power output will also vary. At 12 volts and using an 8 ohm speaker load, the output is 1.3 watts for an input voltage swing of 1.0 volt peak to peak. No heat sinking is required for the output pair under these conditions, but if the rail voltage is raised to 20 volts to take advantage of the 3.5 watts of output, then available heat sinks are necessary.

sinks are necessary.

The transistor in the base circuit of the AY1121 is an optional feature. It is used in the completed unit as a muting switch.

9 Mc. Filter Module (Function 3, Fig. 1)

The performance of the Pye 9-0A crystal filter is—for its price—the best obtainable on the Australian market. Other 9 Mc. filters are obtainable which

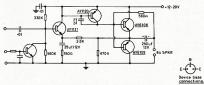


FIG. 2- 4-BAND TRANSISTOR TRANSCEIVER - AUDIO SECTION-RECEIVER.

NOTE: The .01 uF. capacitor across the supply rail in Fig. 2 should read 0.1 uF.

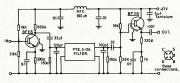


FIG. 3.- 4 BAND TRANSISTOR TRANSCEIVER - FILTER SECTION.

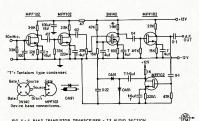


FIG. 4.- 4 BAND TRANSISTOR TRANSCEIVER - TX AUDIO SECTION.

have marginally better performance, but they are usually much more expensive and, being imported, are subject to supply variations. Accordingly, the decision was made to use a 9 Mc. i.f./ss.b. generator system which used the Pye 9-0A.

Fig. 3 gives the circuit diagram and, with one small exception, is as recommended by Pye for use with their filter.

mended by Fye for use with their filter. The exception is the use of fixed capacitors of 120 pF. and 100 pF. at the input and output of the filter instead of the part fixed/part variable capacity recommended by Fye. There capacity recommended by Fye. There were the control discernable difference in the performance of the unit due to this chance.

connige.

The property of the

Tx Audio Module (Function 15, Fig. 1)

This module includes not only the voltage amplification required but also incorporates pre-set automatic audio level control. To a certain extent this latter feature achieves the same end as the more conventional rf. derived al.c. Fig. 1 indicates that provision has been made for both forms in the overall design. Fig. 4 gives the circuit disaram.

A two-stage RC coupled pre-amplifier using Motoroia MPF102s takes input from a 50 ohm dynamic microphone. The stage of the RCA SN40 dual gate FET. Output from the 3N140 dual gate FET. Output from the 3N140 is again amplified in a third MFF102 whose output fed in a third MFF102 whose output fed in the balanced modulator (to be described) while the second output is again amplified and then rectified to gate 3 of the 3N140.

The only critical adjustment on the board is the 1.8K resistor in the drain of the 3N140 and the value of this resistor may have to be adjusted in extreme cases.

The value of 1.8K shown has proved satisfactory on four developmental models. When the correct value is used for the drain resistor of the 3N140 the drain voltage under no signal conditions should be voltage displayed to the state of the state of the speech input. At average input levels the voltage should be around 6 volts.

The 20K audio level control is mount-ed external to the board and connecting pins are provided on the board to make the necessary lead anchor points. These pins also provide connecting points if an external microphone pre-amplifier (mounted in the microphone case) is such a case mounted pre-amplifier is most preferable to prevent r.f. getting into the audio system. However, in this

design lack of knowledge of the type of microphone that would be used prevented this being done. For those who wish to fit a pre-amplifier in the microphone case the circuitry of the first two stages in Fig. 4 are perfectly applicable.

Two pairs of connecting pins are provided on the p.c.b. as anchor points for p.t.t. connections.

AVAILABILITY

As for all the designs published in vision is being made to make available full kits of parts, printed circuit boards or p.c.b's plus full instructions

and diagrams. Twelve or so boards are involved and in the case of the finished job the same board has been used several times. A four-band transceiver for example

uses 21 boards in all. The aim has been to keep the average cost of each board to around \$12-\$15 but of course this must vary from module to module according to its complexity.

The receiver audio kit will cost \$12 less speaker. The transmitter audio kit will cost

\$25 complete.

The filter kit will cost \$30 complete. All of the above prices include all components, p.c.b., diagrams and in-

structions.

P.c.b's alone will be \$2 each, while P.c.b's plus diagrams and instructions will be \$3.

Anyone interested in taking part in this project is invited to write to one of the writers—3AFQ—at 4 Elizabeth St., East Brighton, Vic., 3187, for addi-tional information on supplies of kits or p.c.b's.

(To be continued)

Magazine Review

"BREAK IN"-JUNE 1968 A Double Sideband Transmitter: Five

band d.s.b. rig beginning with a Frank-lin v.f.o. and having a pair of 6DQ6s in the final, Uses disposals parts and tubes readily available in Australia.

Oscilloscope Notes: Information on using the VCR97 disposals c.r.t. in a simple oscilloscope suitable for checking s.s.b. transmitters, etc.

The Minicheck: A small device which turns an ohmmeter into a transistor checker and permits lead identification,

Integrated Circuits: General dissertation on purpose and manufacture of these devices and the promise they hold out for more sophisticated and less expensive consumer products.

B/C Converter for 80 Metre Transceivers: Describes a simple one tran-sistor converter to enable broadcast stations to be received on an 80 metre transceiver.

"BREAK IN"-JULY 1968

Four-Band S.s.b. Transmitter: A phasing rig beginning with 9 Mc. gen-erator and followed by the usual stages to a TT21 final, uses many disposals components and readily available tubes etc. For a power input of around 150 watts d.c. peak. The unit has built-in v.o.x. and a.l.c. all in one cabinet. Hertz Ccycles and Seconds: Describes

the origin of the term "Hertz" for "cycles per second" and explains the relationships between frequency and time and the different time scales in use throughout the world. A good article of general interest without dia-

The Lazy L.A.D.S.: A design for a light actuated dip switch. Simple circuitry using three transistors and an L.D.R.

Wind Speed Indicator, from parts around the Shack: Short article describ-ing how ZL1IM built himself a windspeed indicator from a small permag.

"BREAK IN"-AUGUST 1968

Grinding and Etching Crystals: Cliff Dixon, ZL2FT, and P. J. Rogers, ZL-3NH. Two short articles, one on each of these subjects by the above authors, grouped by the editor to acquaint Amateurs with the crystal working process, by which crystals can be adjusted to frequency

An Eight-Valve ORP S.s.b. Transceiver: From a lattice filter made from FT241 crystals operating in the normal i.f. range to a 6AG7 used as the transmitter final and receiver a.f. stage on 80 mx. A small handy rig for car, field day or home QTH.

Oscilloscope Notes, No. 2: Continuing the article commenced in June "Break

Effects of Stray Capacitance on L and C Measurements: Explains how to make reasonably accurate measurements

of L and C using simple equipment and how "strays" affect accuracy. Transistor Breadboard and Power Supply: An experimenter's approach to solid state techniques.

Linear Amp. for the D.s.b. Tx: De-scribes a linear designed for the d.s.b. tx described in June "Break In" which increases the input power to about the N.Z. legal limit of 300w. d.c. peak using an 813 or a pair of TT21s. E.h.t. about 2,500v. for 813 and 1,100v. for TT21s.

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Repeater Technical Group Meeting

Convened by the Wireless Institute of Australia, this meeting was held at of Australia, this meeting was held at the Scout Hall, Bandianna (near Wodonga), Vic., over the week-end of 21st and 22nd September, 1968. The following minutes represent, I believe, an accurate record of the resolutions adopted at the meeting

Whilet it has been impossible to record the many technical sidelights leading to the formulation of these pronosals, it should be understood that recommendations reflect the death of technical discussion which took place

in and outside the limits of this meeting. The proposals have not been agreed to lightly, and embody an awareness or present and projected requirements compatible with existing equipment and the technical knowledge of those who will have to do the work

It was unfortunate that the VK6 Division was unable to personally ex-press a view, but as mentioned in the minutes, they must feel free to avail themselves of help to explain any angle not clear or not adequately dealt with in denth in this reporting

The decisions of the meeting are, of The decisions of the meeting are, of course, not binding on Divisions. How-ever, the Federal Executive is now ever, the Federal Executive is now preparing a series of policy motions which will be sent to Divisions in the near future. If the Divisions decide to vote in favour of these motions, which will represent the substance of the decisions reached at Wodonga, then the Divisions will formally adopt the conclusions of the meeting as Federal

SATURDAY AFTERNOON Chairman: M. Owen, VK3KI, Federal Vice-President, W.I.A.

Secretary: P. Williams, VK3IZ, Federal Secre-Apologies received from Federal President, J. Battrick, VK3OR; VK5 Division.

Battlete, VXXXI, Vice Division.

Present and sharperts, VXX Counciller and VXII. Cross.

VXIII. Cross.

VXIIII. Cross.

VXIII. Cross.

VXIII. Cross.

VXIII. Cross.

VXIII. C

Peter Dowde, VK7PD, VK7 Div., VK7 Re-

peater.
MacKenzie, VK2ZIM, VK2 W.I.C.E.N.,
Orange R.C.
croe Healy, VK2APQ, VK2 Fed. Coun-

cillor. Arthur Lock, VK3AUL, N.E. Zone. Geoff Taylor, VK5TY, VK5 Fed. Coun-

cillor.
Col. Christenson, VK2BCC.
Jim Linden, VK3AXB, N.E. Zone.

Jim Linden, VASAAD, N.E. 2016.

The meeting opened at 1.35 p.m. and representatives were welcomed by A. Look, VKSAUL. The Chairman hanked VKZDD for the work in initiating the meeting.

Which is merely to eo-ordinate the activities throughout the country. Minutes of this meeting will be circulated to all Divisions and will show the origins of any resolution.

The Chairman then asked that the form of the meeting be approved.—Unanimous,

The Chairman then gave the background to the P.M.G. negotiations, indicating that the Department and Mr. Carroll had adopted a liberal view but emphasized that there should Hours when the state of the sta

The Chairman then called for the status of each Division with respect to repeater develop-

VESABO FOR NOW

VKEAPQ FOR N.S.W.

Repeaters were discussed at Council on 16th Repeaters were discussed at Council on 16th to 16th to

VESTY FOR VICTORIA

VISITY FOR VICTORIA

Dr. D. Blackman reported on the problems
with the presently used repeater of Australia
origin—these were mainly technical and involved coverage. He also stated that over 100
stations were using the present system, but
was concerned with the longer term problem
of linking country and intrastate users. VK2ZJT FOR QUEENSLAND

Mr. Craike advised that Amateurs in this State wished to abide by the systems created by their neighbours, viz. VK2. VESTY FOR SOUTH AUSTRALIA

Mr. Taylor said that experimental operation ad been allowed with a site on the Adelaide

VKIPD FOR TASMANIA

VKITP FOR TASMANIA.

Mr. Dowde, representing two committees were some amendments to the previously circulated letter. Their need for repeaters munications between north and south and the desire to provide intrastate communications. If all that the needing should decide the communications with different frequencies for varied codures, with different frequencies for varied to the contract of the c Technically, operation can take place on either side of existing channels, with 100 kc. separation feasible.

WESTERN AUSTRALIA This Division felt that:-

Standardisation should be universal.
 Federal Executive should be involved in

Federal Executive should be involved in the discussion.
Separation should be 1 Mc.
The frequencies chosen should be ar-rived at after close engineering study and be presented to all Divisions after the meeting. There should be no rush-ing into a compromise. He also reported that approximately ten sta-ions were operating in W.A. on 146 Mc.

VKIDA FOR CANBERRA R.S. Mr. Davis agreed to the general outlines as presented by the N.S.W. Division.

TECHNICAL DISCUSSION In opening the technical discussion, C. Jones, VK2ZDD, noted that the following points had to be resolved:—

Frequency allocations—the spacing of allocations and the deviation to be em-

allocations and the deviation to be em-ployed.

Whether the input was on the high or low side of the band.

To determine the necessary frequency separation and find minimum and maxi-mum limits of this separation.

mun inuties of this separation.

Subsequent discussion indicated consideration of the construction of the

VKIZDD, in answer to a query on coverage, and that service or simple: reputative count of the control of the meeting of the query of the control of the query of the control of the contro

white said that 180 Ke has been used with no describing that the cooked filters have belief the situation. VKINN pointed out that conservation of fre-vKINN pointed out that conservation of fred that between 1455 and 1465 Micro and stated that between 1455 and 1465 Micro and that between 1455 and 1465 Micro and the second out that here could be no usage of with seening agreement.

existing net frequencies.

With seeming agreement of all representatives on the separation of input and output frequencies, the Chairman called for a motion.

1.1 Moved VK2ZDD: "That the separation of input and output frequencies for service translators shall not exceed 500 Kc." Seconded VK3AUL.

transfers shall not exceed 900 Ke." Seconded In specifies to the motion, VIZEU was opposed to it on the grounds that it was simple and the specifies of the motion of the specifies of the specif

gates.

The Chairman thought that time should be allowed for a clarification of these points. VK3ZBJ meved, VK3ZBJ seconded, that discussion on motion and amendment be deferred until the situation was clarified—Carried unani-

After a 15-minute recess, the definitions of a Service and Experimental Translator was put to the chair.

to the chair.

1.2A. Meved VK3ZBJ, seconded VK2ZDD,

"That a Service Translator is a translator designed to be used by current mobile equipment using Channels A, B and C and with the intention of extending the range of similar operation."—Carried unanimeusly.

operation."—Carries unanimensily.

1.2B. "An Experimental Purpose for use translator for experimental purposes for use translator for experimental purposes for use translator for experimental purposes for use the first purpose for the first p

motion with approval of inconder.

1.5. Subsequently, 12 was moved YKAAKK
1.5. Subsequently, 12 was moved YKAAKK
frequencies shall be between and neighbor
properties shall be between and neighbor
properties of the properties of the subsequently o

(1) Input—146.1 Mc. (2) ... 146.2* (3) ... 146.3* Output—145.6 Mc. , 145.7* , 145.8* , 145.9 146.2° ... 146.3° ...

(4) 1.464 ... 1464 ... 1465 ... 1465 ... 1465 ... 1465 ... 1466 to Channel C and the Australis Channel if the frequencies* were used. However, VKZZDD said that a service was already operating on one of these. VKTPD had no objection and VKSTX asked

whether the two channels under question (WKZDD therefore proposed that Channels (WKZDD therefore proposed that (WKZDD therefore proposed the WKZDD therefore proposed the WKZDD

compatible with existing facilities.

VK2ZDD raised the question of national co-ordination of a simplex channel. After intellectual content of the content o

1.6. Moved VK3AKK, seconded VK3ZBJ,
"That 438 Mc. be accepted as a standard f.m.
net frequency."—Carried unanimously. On the subject of Experimental Repeaters.

As the work involved in experimental Repeaters.

As the work involved in experimental, that is a subject of the proposed the proposed the proposed the proposed to the subject of Experimental Repeaters,

SUNDAY MORNING

Meeting then adjourned.

The Charles SUNDAN MONENERS are the content of the The following recommendations were also agreed to by the representatives:

reed to by the representatives:

1. Further discussions can be held on the linking of Interstate stations on 432 Me. It will be desirable in the near future 2. VK2ZDD suggested that it would be desirable to keep a national record of progress and problems during the establishment and running of these repeated.

On the suggestion of VKSAXB asking that all Divisions form technical committees to assist with technical problems. VKSZBJ con-tinued by stating that State groups act in an advisory capacity and linise with the Depart-

1.1. Moved VK3TX, seconded VK3ZBJ:
1.1. Moved VK3TX, seconded VK3ZBJ:
"That the VK2 Division act as the Secretariat
for the co-ordination of v.h.f. net frequencies"
—Carried unanimously. VK7PD stated that his Division had asked

VKFDD stated that his Division had asked that seven or eight channels be made available for Interstate working but felt that the agreements reached would be astistated by Morever in the light of experiment or necessity to the light of experiment or necessity to submit plants to the VKZ Secretariat. The meeting agreed that this was the case, and the Secretariat praced to evidently all offered to the More State repeater committees are formed, representation be allowed from country representation be allowed from country

ed. representation be allowed from country 'XGTZ, Pederal Counciller, noted these re-views and the country of the country of the country of the bound seek the quidence of their State com-sultance of the country of the country of the State Council level. The country of the country of the country of the personnel of the country of the country of the Secretaria. The country of the country of the country of present for making the effort to attend this present for making the effort to attend the country of the coun

He stated that apart from circulating these minutes to all Divisions, notification would be given to Divisional Councils on those matters which could well become Institute policy. Comments which had been given due weight during the discussions and suggested that this Division write to VK2 for clarification on any technical points.
VK2ZDD thanked the Chairman and Sec

presence of Federal Executive on this occasion.

VK3ZBJ, in his remarks, stated that he was very impressed with the calibre of the people present and felt that this augured well for future developments. r their work and was appreciative of resence of Federal Executive on this occa VK3ZBJ, in his remarks, stated that he

Finally, the Chairman thanked Arthur VK-3AUL for his work in organising accommoda-tion and the dinner. The meeting was officially closed at 1005 hours, Sunday, 22nd September, 1968. ----

V.H.F. NOTES

Well it's news time again and still no reports from other States. If any Interstate correspondents have news for the Dec. Issue and can get it to me before Thursday, 5th, I can include them on this page. January "A.R." notes should be in before 2nd Dec. And now

ne news on beacons: VK5VF-144.800 Mc. VK5VF-52.006, 145.000 and 432.590 Mc. VK7VF-144.8 Mc. ZEIJZA-144.016 and 432.048 Mc., both with 100 watts input 15 db. gain antennse and operate continuously.

and operate commune...

Do you know of any other v.h.f. beacons?

If so, please let me have full details so as the details can be published in Dec, "A.R."

—73, Cyril, VK3ZCK. VICTORIA

VICTORIA

The VK3 V.h.f. Group held its annual Convention in Bendigo over the week-end 12th and 13th Oct. We hope that all those who attended had a very enjoyable time. Thanks should go to the Bendigo group for their help and hard work that made the week-end suc-

control. The control of the control from an 238.

Yours truly has arranged several skeds with Ws and KH6s for the coming season, while a We reports that he has a ball rulle long rhombic parts of the coming season. The company of the coming season while a part of the coming season with th isional broadcasts when they become available.

2 Metres: Activity is on the increase due to
the presence of stations from central Victoria.

2 Metres: Activity is configure to being worked
with VKZAWZ in Bendidge is being worked
VKZAMZ has finished his high power sab. rig
which user as CKZ2003 and the full legal power.

Bill has also re-built his beam as the previous
one became unserviceable.

one became unserviceable.

70 Centimetries: No reports have been received for this band and this can be rectified
only by the residual operators sending in details.

1st month's "A.R." has been announced.

1sets roundly a field day but there will
ont be one over the New Year holiday period.

1should send it to Robert VKSAUR (Always
UnReliable). c/o. Vic. Division.

71, Robert VKSAUR.

W.I.A. V.H.F.C.C. New Members: Confirmations

Cert.

48 49 50	VK3ABA VK3AOT VK5EF				110	119 105
Cert.	A	mer	ıdm	ents:	Confin	mations
No.	Call				52 Mc.	144 Mc.
44	VK3AMK VK3ZNJ				132	=
47	VK3ZNJ			1000	130	230

160 Mx Transpacific Tests

The Trans-Pacific Tests which were so suc-cessful last season are to be repeated this summer, and dates and times are as follows: Saturday, 30th November 1330-1600z.

28th 11th January 1st February 15th

"150, VTE West Coast 1975-2000 Frequency of the State of

PROVISIONAL SUNSPOT NOs. AUGUST 1968 beervations at Zurich Observa-

and its stations in Locarno and Day Day



Mean equals 110.9. Smoothed Mean for Feb. 1968: 102.7. -Swiss Federal Observatory, Zurich.

V.H.F. U.H.F.

Interested in what Furnpean Amateurs are accomplishing on these bands. Commencing January 1969, the authoritative German v.h.f. u.h.f. magazine UKW-Berichte will be published quarterly in English. 60 pages of the latest techniques, detailed construction articles on v.h.f. u.h.f. gear and antenna written by top Amateurs in Europe.

Annual subscription \$4.50 AIR MAILED direct from the German publishers. Send a cheque/money order to the Australasian representative of UKW-Berichte, G. Clarke, VK-2ZXD, 2 Beaconview St., Balgowlah, N.S.W., 2093.

A LIMITED number of sample copies of the German edition are available free for inspection.

DX

Sub-Editor: PETER NESBIT, VK3APN 32 The Grange, East Malvern, Vic., 3145

BAND NEWS

23 Me.: CT2AS reported on 28599 at 2315z. This is an interesting country for those who delve into propagation, because CT2 is very close to the opposite side of the earth from MX2/3 and signals could arrive from any 8P6AY-Barbados. Gordon operates 28600 21402 9K2BJ 28583 at 19z. QSL to P.O. Box 8419.

MP4BGX—Bahrein Isl. 28015 at 11z. I QSLing direct, send to R. E. Gregory, 3 A.C.C. Hamala, B.F.P.O., 63.

121 Mer. PXIIP 21350 at 2042r. Tony and Konrod. GSL, via H189Up. 8Z-KKO 21338 at 1892r. "Fred". GSL via W1877C 21375 at 2245r. GSL direct. 2XGAA in Rwanda reported on 21317 at 227. 2XGAA in Rwanda reported on 21317 at 227. 2XGB 21285 at 192. "Part", and ZSSLU 2171 at 1830r. ZSSD 31285 at 192. "Part", and ZSSLU 2171 at 1830r. ZSSD 51285 cards can go to P.O. Box 1935. Windhowst, and ZSSLU via waXCTN. 9K2CB 21275 at 1345z. 9K2BV reported at 8z on 21440, but probably the wrong time or VK. le on 24 ke., out province.

VQSCC is very active, 21089 at 14z. VQSCJ is 10002C ex KANNU will be active from Fernando de Noronha for about a year. He will be active from the control of the control of

CHARD uses 2009 at 1230z. He hopes to nave s.b. going very soon.

TN8BG has been reported on various differ-nt frequencies, 21038 to 21095, at times be-ween 1145 and 2140z.

ZDBDG 21350 at 1330z, Dave. His QBLs can e sent c/o. B.B.C., Ascension Island, South Atlantic. CT2AR CT2AR on 21388 at 22z with QSLs via WA-4WIP; CT2AS 21310 at 20z with cards via K2AGZ CPHW 21300 around 63z. Address is Gerald Kangas, Box 260, La Paz, or else via H. Kangas, 1904 Sec. KTDVK.
CEBAE is QRV 21325 around the 20/22z mark.
AAZCN mainly 21399 Saturdays/Sundays 192.
VEDMD 21048 at 14z.

14 Me.: VP2AW on 14213 at 6022z (Antigua). ZDSCC 14198 2132z. Cards should be sent via ZDSAR. ZDBAR.
VSSTJ 14209 at 1656z. Also skeds WASEFL
every Monday about 1300-133z on 14210. QSL
via Box 36e, Brunel Town, Brunel.
CRHBH 14208 at 61z, "Mary". QSL to Box
90. St. Vincent, Cape Verde 1si.
TJ.8GL 14212 at 2130z, "Gilbert". QSL to FEWW is still active on 14036/018 at 0845 and 1130z. on Easter Isl. is active 02-07z. He CEEAC on Easter 181. 18 active weekends on 14190 around 911M is active weekends on 14190 around 91031, cards via XXXXXIII 4003 at 22 and 132. Raul skeds his QSI manager CEXZN Fridays at 21/222 on 14185. ZEIAE and WB6OFJ may be able to help arrange skeds. 94 and 102. SYOWN in Crete 14034 at 23z. LJ2X is QRV most days in the 14332 inter-national YL net, try 20z. TU2AK daily on 14130 at 1830z. TU2CF 14218

YAZHWI 14020 at 22z is K9HWI who will be there for two years. Cards can go via wFPLT: if direct, please SAE/IRC. FRTZG usually works around 14390/210 and has been reported at 12 and 18z. For an air mail reply, send 3 IRCs to Guy Langilos, Box 992. St. Denis, Reuison 18.

12. St. Denis, Returnou 181.
7 Me.: CRSLV heard on 7008 at 2155z.
812MX "Den" 7003 at 2120z. He hopes to
active 80 mx soon.
487AB "Sunil," worked at 2110z on 7005.
VP2KF 7070 s.s.b. at 2157z. QSL via VE3DLC.
2DBUE 7082 at 22z.

VPEKF 7070 s.s.b. at 2157z. QSL via VEEDILC. ZDBHE 7652 at 22z. 9VILK reported on 7005/18 at 23z daily. He III make skeds for 40/20 mx. Write to R. 10, 12-B Robin Rd. Singapore. 9M2Nz. 12-B Robin Rd. Singapore.

MM2NF works a.s.b. on 7070/7088 around the 19-21z mark.

3A2CN, Pierre, sometimes operates 7090/95 at 19-21z mark.

3A2CN, Pierre, sometimes operates 7090/95 at 19-21z mark.

3A2CN on 7000 at 1900 a carual listener resuses. The sure there's a permeter way skip zone hovering around he 3.5 Me.: 9M2NF is sometimes active 2695/3700 ground 18/21z. He will go QRT sometime in December.

ZSSJM worked on 3505 at 2050z; also ZSSQU again at 2020z.

I.8 Mc.: On 21st Sept., Harry VK3GU worked WIBB on 1865 at about 1010z. Stew's signals were up to S5 at times until they dropped out at 1635z. WIBB intends to be on often from To the control of the

ASSORTED

ASSORTED

As from 1/1/69, stations in the Netherlands Ash from 1/1/69, stations in the Netherlands Process to the following will change their prefixes to the following the process of the following t Next February, W6BPO is going to Norfolk 1sl. and will operate s.s.b. under the call of VK2BPO/9. The many wall operate s.A. under the cell of Gentlement I spores that in the Seph. DX Gentlement I spores that in the Seph. DX Gentlement I spores that in the Seph. DX Gentlement I spore that it is a spore of the Seph. Seph. Gentlement I spore that it is a spore of the Seph. Gentlement I spore that it is a spore of the Seph. Gentlement I spore that it is a spore of the Seph. Gentlement I spore that it is a spore of the Seph. Gentlement I spore that it is a spore of the Seph. Gentlement I spore that it is a spore of the Seph. Gentlement I spore that it is a spore of the Seph. Gentlement I spore that it is a spore of the Seph. Gentlement I spore that it is a spore of the Seph. Gentlement I spore that it is a spore of the Seph. Gentlement I spore that it is a spore of the Seph. Gentlement I spore that it is a spore of the Seph. Gentlement I spore that it is a spore of the Seph. Gentlement I spore that it is a spore of the Seph. Gentlement I spore Questionable validity surrounds 5X5HH, whose alleged QSL manager knows nothing about it. Better check the beam on this one— he may be operating from Cray Island. (FLADXA) FILADXA Roger Baines, ex MP4TBO, will be operating Roger Baines, ex MP4TBO, will be operating Roger Baines, ex MP4TBO, will be operating to the state of the stat

FR7ZP	VQ8CCR	W9WNV/MM
GSAEW	VOSCHR	W9WNV/XU
G5AEW/ZS	VQQAA	W9WNV/ZK1
K1IMP/KC4	VQ9AA/A/C	W9WNV/ZM7
K7LMU/HC8	VQ9AA/D/F	W9WNV/8F
K7LMU/HS	VQ9AA/MM	XW8BF
K7LMU/TI9	VR2EW	XZ2TZ
K7LMU/3W8	VR5AB	YJ8WW
PY0XA	VU2WNV	ZK2AF
VK2ADY	W9WNV/	1B9WNV
VK2ADY/9/0	Blenheim	1G5A
VQSCB	W9WNV/F08	1M4A
VQ8CB/A	WaWNV/	1S9WNV
VQ8CBB	Geyser	5R8BA
VQ8CBN	W9WNV/HK0	5W1AD
The log for available for t	FW8ZZ was lost, his one.	so no cards are

RV4SK VG8CBR W9WNV/KS8

ACTIVITIES

ACTIVI

rest! Could there be much and the country of the co

try total now stands at about 280. (Thanks Rom.—Peter).
From W.A. comes a letter from George Allen, 1802, who has been busy on 180 ms. Recently 1802, who has been busy on 180 ms. Recently 1802, 1802

SOME OSLA WF0ITU-K0YKJ SV0WI-K4AVD PY0APS-PY7APS ZF1DX-K6KDS GC5AGA-K4II G5AGA—K4II PY0BLR—PY4BK

CO2FA-XEIAE EA6BC-W4SYL HP0A-HP1AC PXIRG-DJ6AR YA8MH-DL8MH TTSAN-W5LEF OX3DX-OZ3FD

Acknowledgments to the following for kindly supplying news for this month's column: LIDXA, FLADXA, G3UGT, ZL2AFZ, G. Watts News Sheets, VK3QV, VK4UC, VK3ARV, VK-3AUT, VK5BS, L6942, WØBN, VK3GU. Deadline for news is the end of each month, so please send any items to the address at the top of the page, 73, Peter. Acknowledgments to the following for kindly

BULAWAYO 75th ANNIVERSARY AWARD

Period.—Contacts to be made during the period 1st to 30th November, 1968, inclusive.
 Contacts to be made with at least three

2 Contacts to be made with at reast stace.

Balawaye stations, two-way c.w. or phone.

Any Amateur band.

Any Amateur band.

Control of the control of the control of certified or extract, together with three LRCs, must be sent to: Matabeleland Branch, the control of the certified of the certifi

at 0740v

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Form	nula III.	Ae	rıal	re	ede		****	3003	1.2	0.4
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Book Review

MULLARD SEMICONDUCTOR INTERCHANGEABILITY LIST

This book is the successor to eight This book is the successor to eight editions of the Mullard Transistor Interchangeability List. The title has been changed in keeping with its wider scope. The new issue has been en-larged to include, in addition to tran-sistors, direct Mullard equivalents and sistors, direct mullard equivalents and comparable types for small signal diodes, zener diodes, rectifier diodes, thyristors and semiconductor photoelectric devices. The book, which contains 31 pages with over 4,000 entries, is available from Mullard-Australia Pty. Ltd., cover price \$1,

NOTES ON SOLAR FLARE WARNINGS FOR SUPERSONIC TRANSPORT AIRCRAFT

This booklet makes available infor-mation about the aspects of the work of the Ionospheric Prediction Service Division, Bureau of Metrology, which may be of some interest, but would not normally be published in any scientific or technical journals. Apart from the introduction, the booklet contains five sections covering a summary of the problem, solar activity and proton flares, forecasting of solar events, existing warning systems and an outline of a possible warning system for supersonic transport aircraft.

Although not directly connected with Amateur Radio, the information is interesting, especially for anybody interested in radio astronomy.

HINTS AND KINKS

TRANSCEIVER RELAYS Some transceiver owners have re-

ported that replacement relays are difficult to obtain and are expensive.

Many imported transceivers use re-lays similar to the Siemen's "Cradle" type. Relays for various coil voltages and up to four change-over sets are available from Siemens or Relays Pty. Ltd.

Associated Controls Pty. Ltd., Pad-stow, N.S.W., and their Victorian agents Eastern Instrument Pty. Ltd. in Mel-bourne can supply Allied or Varley relays with six sets of change-ore contacts with heavy duty contacts for those critical positions.—VK3ASC.

NOVEL MAINS TESTER A pocket size neon lamp indicator

A pocket size neon lamp indicator suitable for testing a.c.-d.c. voltages from 100v. to 500v. is now available from Radio Parts Pty. Ltd., Melbourne. Known as the Stuart brand, this handy tester has flexible leads with prods marked positive and negative (red-black), and is fitted with vest pocket clip. Insulated alligator clips can be supplied also to fit the prods.

Trade price for neon tester: 60c each: insulated clips: 10c each; 15% sales tax applicable.

FEDERAL OSL BUREAU

Divisional QSL Managers are advised that there is no official Bureau for FRT Reunion Island and cards should be sent either direct to the station concerned or via R.E.F., Paris. This information comes from FRTZG.

Information on the DX Contest staged by I.A.R.U. Region 2 (Americas) on October 12 and 13 was received too late for prior publication. Anyone interested may obtain all information re scoring and logs from this Bureau. Congratulations to Al Manwaring, VK2QK, of Cootamundra, on schieving CHC100 High Honors award. All CHC members will realise the ability and work involved in qualifying for this honor.

to this home:

WIVIP George Chough, of Correlous, MarshWIVIP George Chough, of Correlous, Marshsked with a VK station over the period Dector or correlation of the process of the
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U.S.A. K6EX, founder of CHC, advises of the 1st CHC International C.W. DX Contest scheduled for 60012, Saturday, Dec. 7, to 24002, Sunday, Dec. 8. The contest is open to all Amateurs whether CHC members or not. The contest

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scoring, logs, etc., may be ourserve soon. Bureau. Bureau. Bureau. Welcorian Division on the onceas of their recent unusual 160 meter context. The provision of cross-mode and cross-band contacts made for a wealth of interest to all participants. A word of thanks is also due to the interstate and ZL stations who contributed to the success by participating in the event.

-Ray Jones, VK3RJ, Manager.

FEDERAL AWARDS AUSTRALIAN D.X.C.C. COUNTRIES LIST

VS9H—Kuria Muria Is. Only contacts prior to 29/11/87 will be credited. From 30/11/67 VS9H counts as MP4M—Muscat and Oman.

ZC8—Palestine. Only contacts prior to 2/7/88 will be credited.

2/7/98 Win be created.
Additions:
Bienheim Reef, Geyser Reef. These two countries will be credited if contacts were after 4th May, 1967.
Nelsons is, will count as Chagos and is not a separate country. This also will be credited after 4th May, 1967.

created after 4th May, 1907.
Where cards for the above additional countries have been forwarded for credit prior to this time they have been noted. The countries can be considered accordingly. In the case of the deleted countries, all members who have claimed them have had their scores amended as necessary. Space does not allow a full list of all

UNACCEPTABLE OPERATIONS FOR D.X.C.C.

QSLs from the following will not be credited

K7LMU/HC8E—Ebon. K7LMU/TI9C—Corman K1IMP/KC4—Navassa.

KIIMP/KC4—Navassa.
VU2WNV—Laccadives.
VQ9AA/C—Chagos.
PY0YA—St. Peter & St. Paul's Rocks.
VK2ADY/0—Heard Is.
IB9WNV—Blenheim Reef.
IGSA—Geyser Reef.

OVERSEAS AWARDS

The Federal Awards Manager advises members and the Federal Awards Manager advises members are also as a second of the Federal Awards without the necessity of forwarding cards oversons. Cards will, where necessary, be cheeked in VK. Application warding a Sa.ke., size 9 x 4 inches, to the Federal Awards Manager, W.I.A., Box 2011W. Compared Awards Manager, W.I.A., Box 2011W. Compared Awards Manager, W.I.A., Box 2011W. Compared Awards Worked All Zones—WZE X-SA, DX Award. Worked All Zones—WZE X-SA, DX Award.

J.A.R.L. Awards: AJD-All Japan Districts: WAJA-Worked All Japan Prefectures: JCC-Japan Century Cities

I.A.R.U. Award: WAC-Worked All Con--Geoff Wilson, VK3AMK, Manager.

Publications Committee Report

The Committee met on 7th October, when correspondence was received from VKSMY, VKSMA, VKSQX and VKSUG, the last two named also submitted technical articles, as did VKSASI. Official acknowledgments have

did VEZASI. Official acknowledgments have been sent to these authors.

The Committee had hoped to review our manning position of the property of the property

sources.

All the information sought by the subcommittee appointed at the last Federal Convention has been collated and passed to them,
and we understand the final report is now
heing completed ready for submission to the

Federal Councillors. The outcome of this re-port is eagerly awaited by the Committee, as the future of "A.R." depends very much on the future of "A.R." depends very mucn on the results.

The Committee considered and resched final agreement on the form of the questionnaire which had been under consideration for several months. This questionnaire will be found in the centre pages of this issue and we request all residers to complete it and return it immed-all residers to complete it and return it immed-

CONTEST CALENDAR Until 31st Dec.: Concurso Mexico 1988 (L.M.

Bit No. International OK DX Contests
\$10,1304. International OK DX Contest
\$10,1304. International OK DX Contest
\$254,2404 Nov.; "CQ" W.W. DX Contest (c. W.).
Th Dec. 1986 to 12th Jan. 1996; Ross A. W.).
1st/2nd Feb. 1990; John Morjo Mersen Nat1st/2nd Feb. 1989; Adv. 1990; Memorial Nat1st/2nd Feb. 1989; ARR.L. DX Test (phone
section).

HAMADS

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CREED Model 78 Teleprinter (Page Printer), 1st class order, VK4PJ, 16 Bede St., Balmoral, Old., 4171, STD 99-2881.

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